South Carolina Department of Health
and Environmental Control

INITIAL GROUND-WATER ASSESSMENT

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INITIAL GROUND-WATER ASSESSMENT

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INITIAL GROUND-WATER ASSESSMENT IMPLEMENTATION

I. Purpose - This guidance document outlines the standardized scope of work for an Initial Ground-Water Assessment (IGWA). The IGWA should be conducted at sites where a release of petroleum from a regulated underground storage tank (UST) has been confirmed and additional information is necessary to categorize the release. The objective of this

standardized scope of work is to determine the release's initial risk classification by conducting a receptor survey, installing one ground-water monitoring well, and collecting and analyzing one soil and one ground-water sample for petroleum chemicals of concern (CoC). All site rehabilitation activities must be conducted by a SCDHEC certified site rehabilitation contractor as required by the State Underground Petroleum Environmental Response Bank (SUPERB) Site Rehabilitation and Fund Access Regulations R.61-98. All site rehabilitation activities related to a release from an UST require technical approval by the Department in accordance with state and federal directives. In addition to technical approval, preapproval of all costs is required for payment from the SUPERB Account. Once any SUPERB deductible is met, the Department can directly procure the services of a site rehabilitation contractor for the UST owner or operator upon their request.

II. Standard - The IGWA is a standardized scope of work; therefore, a work plan should not be submitted to the Department. Upon receiving approval for implementation of the IGWA from the Department, the following scope of work should be completed at the designated site within 60 days or as established by the Department.

III. Assessment Implementation

A. Receptor Survey and Site Data

All wells (drinking and non-drinking water wells) and other potential receptors (utilities, surface waters, wetlands, etc.) within 1,000 feet of the site, and the current use of the site and adjacent land (commercial, residential, agricultural, or industrial) shall be documented. If a drinking water well is located within 250 feet of the UST system (1,000 feet if a municipal supply well), a water sample shall be obtained from each well and analyzed for the appropriate parameters. The Department's project manager shall be notified at (803) 898-4350 at the earliest opportunity if any drinking-water wells are sampled within a 250 foot radius so the approved SUPERB cost agreement can be amended.

B. Monitoring Well or Boring Installation

One permanent monitoring well constructed of two-inch diameter PVC casing with a ten-foot PVC screen bracketing the water table shall be installed in the area showing the highest concentration of CoC above risk based screening levels as documented from the previous soil and/or ground-water assessment. The method of well installation (e.g., hand auger, conventional drilling rig, etc.) is at the discretion of the contractor. The well must be installed under the direct supervision of a South Carolina certified well driller and constructed in compliance with the South Carolina Well Standards and Regulations, R.61-71. The well shall require proper filter pack, grout, locking well cap, well pad at or above the land surface, data plate, and a cover held in place with bolts or screws. During well installation, soil samples are to be collected for screening at five-foot intervals. The soil lithology of each sample is to be described and the field screening readings reported in the boring log.

If ground water is encountered within 25 feet of the surface, a monitoring well shall be installed. If ground water is not encountered within 25 feet of the surface, additional boring footage up to a depth of 50 feet of the surface shall be completed subsequent to notification to the Department's project manager. All ground-water wells shall be properly developed. The development method will be capable of removing enough formation cuttings, drilling fluids, and additives to provide relatively sediment-free ground water samples that are typical of the shallow aquifer. All development waters shall be containerized and disposed of in an appropriate manner.

The static water level shall be measured after each well is developed and allowed to equilibrate for a minimum of six hours.

If ground water is not encountered within 50 feet of the surface, or if auger refusal occurs prior to 50 feet, the soil sample with the highest field screening value shall be prepared for laboratory analysis. If the field screening for all samples within the boring are within ten percent of each other, the sample from the greatest depth above the water table shall be submitted for analysis. The boring shall be properly abandoned per the South Carolina Well Standards and Regulations, R. 61-71.

C. Sampling and Analysis

1) Soil Sample.

The soil sample with the highest field screening reading shall be submitted to a South Carolina certified laboratory for analysis. If the field screening for all sample measurements within the boring are within ten percent of each other, the sample from the greatest depth above the water table shall be collected and submitted for analysis as discussed below.

A high-level (>200 *u*g/kg) or low-level (≤200 *u*g/kg) sample based on soil screening results shall be collected in accordance with EPA Method 5030B and 5035 protocol, respectively. The number and type of sampling containers, weighing of samples in the field, use of preservatives, and holding times must be in accordance with SW846, Test Methods for Evaluating Solid Wastes. All industry standard quality assurance and quality control methods shall be followed for shipping (sample label, sealed sample containers, chain of custody prepared, stored on ice). The sampling logs should note the location and type of each sample submitted for analysis.

The soil sample shall be analyzed for Benzene, Toluene, Ethylbenzene, Xylenes, Naphthalene, and Polynuclear Aromatic Hydrocarbons (PAHs). Sampling for the eight RCRA metals shall be added if the assessment includes a release from a waste oil UST. The metals sample should not be filtered. All laboratory analyses shall be performed by a laboratory that is certified for the relevant Environmental Protection Agency methods by the Department. See Table 1 below for the approved analytical methods.

2) Ground-water sample.

The collection of a ground-water sample is not necessary if ground water is not encountered in the boring, or if the thickness of free product in the well exceeds 0.01 feet (1/8 inch). The distance from the top of the casing to the free product, to the ground water table, and the thickness of free product shall be reported.

The well shall be purged prior to sampling and the pH, temperature, dissolved oxygen and specific conductance reported. Purging is considered complete once the ground-water temperature and pH measurements have equilibrated. All purge water shall be containerized and disposed of as appropriate.

The ground-water sample shall be submitted to a South Carolina certified laboratory for analysis. All industry standard quality assurance and quality control methods shall be

followed for shipping (sample labels, sealed sample containers, completed chain of custody forms, shipment to the laboratory on ice).

The ground-water sample shall be analyzed for Benzene, Toluene, Ethylbenzene, Xylenes, Naphthalene, Methyl Tertbutyl Ether (MTBE), Lead, EDB, and PAHs. Sampling for the eight RCRA metals shall be added if the assessment includes a release from a waste oil UST. All laboratory analyses must be performed by a laboratory that is certified for the relevant Environmental Protection Agency methods by the Department. See Table 1 below for for the approved analytical methods.

Table 1. Soil and Ground-water Analysis

TABLE 1	Soil Samples	Water Samples
PRODUCT	Analyte....Method*.....RL**	Analyte.....Method*.....RL**
Gasoline, Diesel, Fuel Oil, Kerosene	BTEX.....5035/8260B.....5Fg/kg Naphthalene.....5035/8260B.....5Fg/kg PAH.....3550B/8270C.....660Fg/kg TPH(DRO).....3550B/8015B.....10mg/kg Total Organic Carbon.....9060.....10 mg/kg	BTEX.....5030B/8260B.....5Fg/l Naphthalene....5030B/8260B.....5Fg/l MTBE.....5030B/8260B.....40Fg/l EDB.....5030B/8260B.....5Fg/l PAH.....3510C/8270C.....10Fg/l Dissolved Oxygen & Carbon Dioxide.....SM4500-O G.....1.0mg/l Ferrous Iron.....SM3500-Fe D.....30Fg/l Total Lead (unfiltered)...7421.....5Fg/l Methane...Kerr Method. .....1mg/l Nitrates.....9056 or 9210....100Fg/l Sulfates.....9056 or 9038.....0.1mg/l
Waste Oil	BTEX.....5035/8260B.....5Fg/kg Naphthalene.....5035/8260B.....5Fg/kg PAH.....3550B/8270C.....660Fg/kg TPH (DRO).....3550B/8015B.....10mg/kg Total Organic Carbon....9060...0.10mg/kg Metals Lead***.....7421.....250Fg/kg Mercury.....7471A.....10Fg/kg Arsenic.....7060A.....250Fg/kg Barium.....6010B.....2,500Fg/kg Cadmium.....7131A.....500Fg/kg Chromium....7191.....250Fg/kg Selenium.....7740.....250Fg/kg Silver.....7761.....250Fg/kg	BTEX.....5030/8260B.....5Fg/l Naphthalene.....5030/8260B.....5Fg/l TPH.....9071.....40mg/l PAH.....3510C/8270C.....10Fg/l Dissolved Oxygen & Carbon Dioxide....SM4500-O G...1.0mg/l Ferrous Iron.....SM3500-Fe D.....30Fg/l Nitrates.....9056 or 9210.....100Fg/l Sulfates.....9056 or 9038.....1mg/l Methane....Kerr Method.....1mg/l Metals Lead.....7421.....5Fg/l Mercury.....7470A.....0.2Fg/l Arsenic.....7060A.....5Fg/l Barium.....6010B.....50Fg/l Cadmium.....7131A.....0.1Fg/l Chromium....7191.....5Fg/l Selenium.....7740.....5Fg/l Silver.....7761.....5Fg/l

BTEX - Benzene, Toluene, Ethyl-benzene, Xylenes
Naphthalene - **TOTAL** Naphthalenes
MTBE - Methyl Tertiary Butyl Ether
PAH - Polynuclear Aromatic Hydrocarbons (Benzo(a)anthracene, Benzo(b)flouranthene, Benzo(k)flouranthene, Chrysene, Dibenz(a,h)anthracene)
EDB - Ethylene dibromide
* - **OR** equivalent method that can achieve the same reporting limits; for Dissolved Oxygen, Carbon Dioxide, and Ferrous Iron, include field methods
** - RL = Reporting Limit
*** - Lead required for all IGWAs

D. Water and Soil Disposal

All soil, development water and purge water generated during implementation shall be temporarily stored in 55 gallon drums or a similar container. Upon receipt of laboratory analytical results, the soil and/or water shall be properly disposed in the appropriate manner. Soil and Water Disposal Manifests shall be included in the IGWA Report as Appendix E.

IV. ASSESSMENT REPORT

The findings shall be provided on the enclosed Initial Ground-Water Assessment Report form. Form explanation/description follows:

Introduction

- Facility Name.
- The name, address, and telephone number of the UST owner or operator and the SCDHEC UST Permit number.
- The name, address, and telephone number and certification number of the contractor that conducted the IGWA.
- The name, address, telephone number and the certification number of the well driller that installed the boring/monitoring well.

Receptor Survey and Site Data

If any answers to the Receptor Survey are marked "Yes", all available information about that potential receptor shall be provided. For example, if a water well is located within 1,000 feet of the site, provide the type of well (public, private, etc.), well screen depth and interval, and the aquifer in which the well is screened, if the well owner has the information.

The current use of the site and surrounding area should be outlined in the space provided in the report form (e.g. commercial, residential, etc.).

Soil and Monitoring Well Information

- Describe the primary soil type and field screening results.
- Provide the monitoring well installation and development date(s).
- Describe the well development procedure.
- Depict on the map where the monitoring well was installed and the justification for the location.
- Provide the soil analytical data in space provided on the report form.
- Describe how the soil sample was collected (e.g. two encore samplers and one four ounce jar) and preserved.

Ground-Water Data

- Indicate the depth to ground water.
- Describe the ground-water purging/sampling methodology and provide the date sampled. Include purging measurements (temperature, pH, dissolved oxygen, specific conductance.)
- If free product is present, provide the thickness.
- Present the ground-water analytical data in the space provided on the Report Form. Attach laboratory data from any water wells within 250 feet.

Appendices

The appendices required for the report are as follows:

Appendix A. Well Construction Log

The monitoring well construction log must include all information as outlined in the S.C. Well Standards and Regulations R.61-71.11E(2). Attach a copy of SCDHEC Form 1903, Water Well Record.

Appendix B. Laboratory Data

Include the field sampling logs, chain of custody forms, and certificates of analyses.

Appendix C. Topographic Map with site location marked.

This must be a United States Geologic Survey 7.5 minute quadrangle with site and pertinent receptors marked.

Appendix D. Site Base Map

The site base map shall be accurately scaled, but does not need to be surveyed. The map shall show the following:

- Legend including the facility name and address, UST Permit # and a bar scale.
- North arrow.
- Location of property lines.
- Streets or highways (indicate names and numbers).

- Location of buildings.
- Paved areas on or adjacent to site.
- Location of all present and former above ground and underground storage tanks and associated lines, pumps, and dispensers.
- Underground and aboveground utilities on or adjacent to site (sewer, water, telephone, gas, electric, etc.).
- Location of any other potential receptors.
- Previous soil sampling locations.
- Boring/Monitoring well location.

Appendix E. Soil and/or Water Disposal Manifests

Appendix F. Additional Data

If ground-water wells within a 250 foot radius of the site or metals in soil and/or ground water were sampled, include purging data, chain of custody and laboratory analysis forms. Laboratory data shall be summarized in a tabular form.

INITIAL GROUND-WATER ASSESSMENT REPORT

Facility Name:_____

UST Permit Number:_____

UST Owner or Operator's Name:_____ Address:

_____

Phone Number: _____

Property Owner's Name (if different than UST owner/operator):_____ Address:

_____

Phone Number: _____

Contractor: _____Cert. #_____

Address: _____

Phone Number: _____

Well Driller:_____Cert. #_____

Address:_____

Phone Number:_____

Receptor and Site Data
Please place a check in the appropriate answer block for each question:

Receptor Survey Questions	No	Yes *
Is there a drinking water supply well (public or private) or surface water supply intake within 1000 feet of the UST?		
Are irrigation or other non-drinking water wells located within 1000 feet of the UST?		
Are there other potential receptors (i.e.,utilities, surface waters, wetlands) less than 500 feet from the UST?		

* If "yes" provide additional information:

_____

_____

_____

Were any water wells within 250 ft radius sampled? _____ Yes _____ No

Is a public water supply line in the area? _____ Yes _____ No

Is the current use of the facility and surrounding properties commercial, residential, agricultural or industrial?

Site:_____Adjacent Properties:_____

See Appendix F for Chain of Custody Form and Laboratory Data.

Soil and Boring/Monitoring Well Data

Primary Soil Type: _____

Well Installation Method and Date: _____
Development Method: _____

Soil Sample obtained at _____feet.

SOIL ANALYTICAL DATA

Benzene (ug/kg)	Toluene (ug/kg)	Ethylbenzene (ug/kg)	Xylenes (ug/kg)	Naphthalene (ug/kg)

Benzo(a)-anthracene (ug/kg)	Benzo(b)-fluoranthene (ug/kg)	Benzo(k)-fluoranthene (ug/kg)	Chrysene (ug/kg)	Dibenz(a,h) anthracene (ug/kg)

Total PAH (ug/kg)	Lead (ug/kg)

*For waste oil UST releases only:

Total Chromium* (ug/kg)	Mercury* (ug/kg)	Selenium* (kg/ug)	Silver* (kg/ug)

Arsenic* (ug/kg)	Barium* (ug/kg)	Cadmium* (ug/kg)

Ground-Water Data

Depth to Ground Water: _____

Well Purging/Sampling Method: _____

Date Sampled: _____

Free Product Thickness: _____

Equilibrated values:

Temperature:_____ pH:_____

Dissolved Oxygen:_____ Specific Conductance:_____

Soil/Water Disposal Method:_____

GROUND-WATER ANALYTICAL DATA

Benzene (ug/l)	Toluene (ug/l)	Ethylbenzene (ug/l)	Xylenes (ug/l)	MTBE (ug/l)	Naphthalene (ug/l)

Benzo(a)-anthracene (ug/l)	Benzo(b)-fluoranthene (ug/l)	Benzo(k)-fluoranthene (ug/l)	Chrysene (ug/l)	Dibenz(a,h) anthracene (ug/l)

EDB (ug/L)	Total PAH (ug/L)	Lead (ug/L)

*For waste oil UST releases.

Total Chromium* (ug/kg)	Mercury* (ug/kg)	Selenium* (kg/ug)	Silver* (kg/ug)

Arsenic* (ug/L)	Barium* (ug/L)	Cadmium* (ug/L)

Appendices

The appendices required for this report are as follows:

Appendix A. Well Construction Log
Appendix B. Laboratory Data
Appendix C. Topographic map with site location marked.
Appendix D. Site Base Map
Appendix E. Disposal Manifest(s). (Must be included for payment from SUPERB)
Appendix F. Additional Data (Sampling Results of Existing Ground-Water Wells)

Report Completed By: _____ Contractor Cert.#_____
(signature)

Date: _____